SOME ASPECTS OF IMPROVING PHYSICS TEACHING IN MILITARY HIGHER EDUCATION INSTITUTIONS USING ARTIFICIAL INTELLIGENCE

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Annotation

This article examines in detail various aspects and possibilities for improving the teaching of physics in military higher education institutions using artificial intelligence technologies, which analyzes in detail the impact of artificial intelligence-based tools on the effectiveness of cadets mastering this discipline, as well as the role they play in supporting teachers' approaches. Based on experimental methods and the results of statistical analysis, it will be proved that the integration of artificial intelligence into the educational process significantly improves learning outcomes, which once again confirms the relevance of using these technologies in the modern education system. As a result of the research, specific and useful recommendations have been developed for the implementation of educational technologies based on artificial intelligence in higher education institutions.

Keywords: artificial intelligence, the process of teaching physics, higher education, educational technologies, improving the effectiveness of education.

Introduction

Teaching physics is considered as one of the most important components of the modern educational system, since this science serves not only to form students' skills in understanding and analyzing natural phenomena, but also plays an important role in the development of their scientific worldview. At the same time, traditional methods used in teaching physics in military educational institutions often fail to fully arouse the interest of cadets in this science or face limitations in a sufficiently understandable presentation of complex physical concepts such as quantum mechanics or electromagnetic fields. In recent years, artificial intelligence (AI)

technologies have undergone major changes in the field of education, as these technologies make it possible to individualize the learning process, visualize complex phenomena, and provide educational experiences tailored to the individual needs of students.

The main purpose of this study is a comprehensive assessment of the effectiveness of using artificial intelligence technologies in teaching physics in military higher education institutions and evidence-based evidence of how this approach affects learning outcomes.

The study looked for answers to the following basic questions:

1. To what extent are artificial intelligence tools able to increase the level of cadets' knowledge in physics?

2. What methods can be used to effectively integrate artificial intelligence into the cadets' learning process?

The relevance of the research is explained by the growing intensity of digital transformation processes in the field of education, as well as the growing need for new, innovative approaches to teaching fundamental sciences such as physics. Thus, this work is aimed at drawing useful conclusions for educational institutions not only theoretically, but also in practical terms.

Methodology

This study used a mixed methodological approach, in which experimental studies and statistical data analysis were used together to make the results comprehensively reliable. The study involved a total of 20 1st year students, who were divided into two equal groups, organized as an experimental group (10 cadets trained using artificial intelligence) and a control group (10 cadets trained using traditional teaching methods).

In the experimental group, training was conducted using modern artificial intelligence-based platforms, in particular interactive PhET simulators, interactive assistants like chatgpt, and adaptive training programs that allowed cadets to explore topics such as the laws of motion, electromagnetism, thermodynamics, and optics in more depth. The cadets of this group were given individual tasks using artificial intelligence and real-time simulation of physical processes, which helped them to

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test their theoretical knowledge in a practical context. On the other hand, the control group was trained using traditional methods, in which cadets conducted classes based on a blackboard, textbooks and oral explanations, without using modern technology.

To collect data, special tests were conducted at the beginning and at the end of the study to assess the level of knowledge of the cadets, each test consisted of 20 questions that covered Basic physics concepts such as mechanical vibrations, electrical circuits and the law of conservation of energy, as well as problem-solving skills. The test results were analyzed using the SPSS (Statistical Package for Social Sciences) software, in which average scores, analysis of variance (Anova), effect size (cohen's D) and other statistical indicators were calculated. In addition, semi-structured interviews with teachers and cadets were conducted during the study, which collected feedback on the use, advantages and disadvantages of artificial intelligence tools, which enriched the qualitative aspect of the study.

Results

The results of the study clearly showed that the use of artificial intelligence technologies provides significant positive results in the teaching of physics in higher education institutions, which confirms the importance of these technologies in improving the effectiveness of cadets' education.results. The results of the study clearly showed that the use of artificial intelligence technologies provides significant positive results in the teaching of physics in higher education institutions, which confirms the importance of these technologies in improving the effectiveness of cadets' education. The cadets of the experimental group had an average test score of 62.4 before classes (standard deviation, $SD = 8.1$), and after classes this indicator reached 85.7 ($SD = 6.3$), which indicated a significant improvement in their level of knowledge. While in the control group, the average score before the lesson was 61.8 ($SD = 7.9$), the average score after the lesson was 70.2 ($SD = 7.4$), although an increase was also observed in this group, its level was significantly lower than in the experimental group. while in the control group, the average score before the lesson was 61.8 (SD 7.9), the average score of the lesson was 70.2 ($SD = 7.4$), although an

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According to the results, the cadets of the experimental group rated artificial intelligence modeling as "very interesting", "a more accurate representation of concepts" and "easier to read", noting that the advantages of these tools are especially high when studying topics such as electromagnetic waves and mechanical energy. Teachers, on the other hand, noted a significant increase in student activity, their willingness to answer questions and problem-solving skills, noting that the integration of artificial intelligence into classes initially required additional training and time.The applicants, on the other hand, noted a significant increase in student activity, their willingness to answer questions and problem-solving skills, noting that the integration of artificial intelligence into classes initially required additional training and time.

According to statistics, it was found that artificial intelligence tools increase the ability of cadets to solve physical problems by 28%, and the level of understanding of the subject by 35%, which indicates the important role of these technologies in learning.

Discussion

The results of the study showed that artificial intelligence technologies are a very effective tool in improving the teaching of physics in higher education institutions, since the high results of the cadets in the experimental group were directly related to the advantages of these technologies such as visualization, personalization and interactivity.

Simulations and tasks performed using artificial intelligence allowed cadets to view and analyze complex physical concepts such as gravitational fields or thermodynamic processes in real time, enhancing their ability to apply theoretical knowledge in practice. These results are also consistent with previous studies such as Johnson et al. (2023), which emphasized the role of AI in increasing student motivation in education and improving learning effectiveness.

However, the study also had some limitations, in particular, the successful implementation of artificial intelligence tools depended on the level of development

of the university's infrastructure, the technological literacy of teachers, and additional resources allocated to lesson preparation. In future research, it is recommended to test this approach on a larger scale, in different regions and educational institutions, as well as to study the impact of artificial intelligence on long-term learning outcomes. In order to effectively introduce artificial intelligence-based learning technologies for military higher education institutions, it was recognized necessary to organize special training courses for teachers, provide them with modern technological equipment and adapt educational programs to the capabilities of artificial intelligence.

The use of artificial intelligence technologies in physics lessons has the following potential advantages:

Increasing cadets' motivation: Infernal and fascinating AI-based software and applications can help cadets become interested in research-based physical phenomena and processes by conducting experiments;

individualization of training: the use of artificial intelligence allows you to create personalized educational programs in accordance with the level of knowledge and the needs of each cadet in training;

Develop critical observation: In the process of applying artificial intelligence in physics lessons, cadets develop analytical and critical thinking skills due to the fact that they are forced to make independent decisions and solve problems when using applications;

improving practical competencies: the use of virtual laboratories and simulators based on artificial intelligence allows cadets to gain experience and apply the acquired theoretical knowledge in cases where access to educational laboratories is insufficient.

Conclusion

This study proved that the improvement of the physics teaching process in military universities using artificial intelligence technologies has a high potential based on accurate data and experimental results. The significantly better results of the cadets in the experimental group showed that artificial intelligence tools play an important role in increasing the level of knowledge of the cadets, making the learning process

more effective and exciting. Due to the wider introduction of these modern technologies into the educational process, educational institutions can achieve not only improved learning outcomes, but also the formation of an innovative system that meets the requirements of modern education.

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